

Some Paradigms for Scientific Interpretation of the Burst Search

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Some versions of interpretation

(assume we are setting upper limit,
not claiming detection)

- Instrumental, w/o reference to astrophysics
- As if searching for modeled signals
- Triggered by other astronomical signals
- What can we say about truly unmodeled events that is astrophysically interesting?

“Instrumental” description

For a signal matched to each filter used:

By Monte Carlo, determine level above which coincident signals are absent at, say, 95% confidence level, as a function of rate.

This is the most robust kind of limit, since it depends only on internal features of our measurement.

But we need to give enough detail so that reader could compare to her favorite model.

Interpretation by model

For a variety of signal templates representing results of model calculations:

Choose a filter that gives strong response to signal, calibrate upper limit in terms of signal strength.

Use Monte Carlo for a Euclidean distribution of signal strengths.

Can set upper limit in parameter space of, say, space density vs. event rate.

Search triggered by other astronomical signal

This has been thought through by Finn, Mohanty, and Romano. It doesn't rely on knowing a waveform, but still tells you about a known, if gravitationally unmodeled, kind of source.

Szabi Marka is setting this up for the Burst Group.

Limits on unmodeled events?

- “Instrumental” upper limit, w/ Monte Carlo for Euclidean signal strength distribution.
- Are there “cherished beliefs” to refer to? Generic features of gravity wave generation that could let us rule out whole classes of events?
- Or is a search for unmodeled events only richly interpretable if we were to find something?